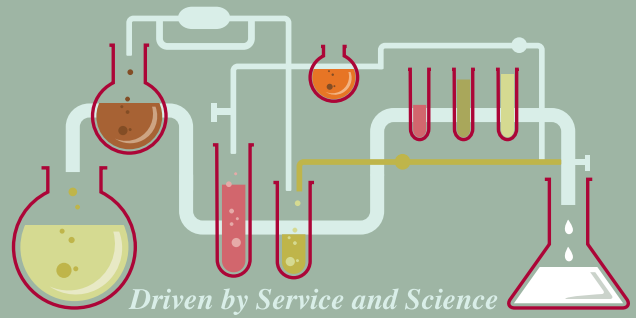


Maxxam Analytics benchtalk



Holiday 2009

Ontario

ceo's note



Season's Greetings!

By now you may already know our big news. In mid-October, we acquired Burnaby, B.C.-based CANTEST Ltd., including its laboratory locations in Victoria and Winnipeg. Cantest is British Columbia's largest independent analytical laboratory business, specializing in environmental, food and pharmaceutical laboratory services—it's a wonderful addition to the Maxxam family.

The acquisition represents an obvious and exciting opportunity to strengthen Maxxam's presence in Western Canada and more specifically in the British Columbia marketplace, where we now have over 350 employees. But this is not just about Western Canada. For our customers throughout Canada, we look forward to introducing and extending some of Cantest's specialized services such as ecotoxicology and bioanalytical services.

The acquisition continues Cantest's growth trajectory, while carrying on the work and legacy of one of its founders, Dr. Donald B. Rix, a leader in the British Columbia biotechnology and business communities. Like Maxxam, Cantest has a solid commitment to science, innovation, quality and exceptional customer service. We're pleased to add Cantest's extensive experience and knowledge to our team.

It may be a gross understatement to observe that 2009 has been a challenging year for our industry. For our

part we have felt the impact in reduced volumes and inconsistent, often unpredictable demand. Through it all we have worked hard to ensure that we remain responsive and that we have not cut corners that could impact our ability to deliver on the promise of on time, accurate, defensible data. Ultimately you are the judge of our performance and we always welcome feedback on how to improve our service.

Like Maxxam, CANTEST has a solid commitment to science, innovation, quality and exceptional customer service.

We're pleased to add their extensive experience and knowledge to our team.

As we turn the page to 2010, I wish everyone all the very best for the holiday season. We are grateful for your support over the past year and we look forward to working with you in the New Year. ☐

Jon Hantho

**President & Chief Executive Officer
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feature

Polychlorinated Biphenyls Total Aroclors or congeners

Polychlorinated biphenyls (PCBs) are biphenyl molecules with varying degrees of chlorine substitution on the ring structure. The amount of chlorine substitution and the location of the chlorine(s) on the biphenyl ring dictate the chemical and physical properties of the material, and are used to describe the individual molecules. Each possible configuration is referred to as a congener, with 209 possible congeners.

PCB homologues refer to groupings of PCBs having the same molecular weight, i.e., the same number of chlorine atoms on the biphenyl molecule. Hence, homologue groups are described as monochlorobiphenyls (one chlorine – 3 congeners), dichlorobiphenyls (two chlorines – 12 congeners), trichlorobiphenyls (three chlorines – 24 congeners), etc.

Mixtures of PCB congeners having specific chemical and physical characteristics depending on the proportion of each congener in the mix were manufactured and sold in North America by Monsanto Co. under the trade name *Aroclor*. Aroclor mixtures are designated by a four digit code, with the first two numbers representing the type of compound (12 = biphenyl) and the last two digits representing the percent chlorine by weight. Hence, Aroclor 1248 is a chlorinated biphenyl mixture containing 48 per cent chlorine by weight.

Although PCBs are recalcitrant and persistent, they have been shown to degrade under normal environmental conditions, primarily by two main mechanisms: biodegradation and weathering. Therefore the PCB congener patterns in older Aroclor mixtures can be altered. This is important because PCB patterns observed in ambient environmental samples may not match the composition of the original source Aroclor mixture(s).

Industry standards for the determination of PCBs in environmental matrices range from simple low cost, high volume analyses for Aroclor mixtures using gas chromatography coupled with electron capture detection (GC/ECD) to the higher cost, specialized analysis using gas chromatography combined with high resolution mass spectrometry (GC/HRMS).

Each approach offers its own unique advantages and disadvantages depending upon the needs of the project. Table 1 (below) summarizes the more common analytical methods.

Table 1: Comparison of Analytical Methods for PCBs

Method	Reference	Relative Cost	Reporting Limits		Application
			Soil (µg/g)	Water (µg/L)	
GC/ECD	EPA Method 8082	Low	0.01	0.05	Aroclors
GC/LRMS	EPA Method 8270	Medium	0.01	0.02	Homologues
HRGC/HRMS	EPA Method 1668	High	0.000003 - 0.000007	0.00005 - 0.0002	Congeners


The analytical approaches presented in Table 1 do not represent an exhaustive list of options. As an example, GC/ECD methods can be used to analyze for PCB congeners, but with some important caveats. Depending on the sample matrix (and potential interferences), these may include lack of specificity for individual compounds (relative to HRGC/HRMS analysis), co-elution of congeners, and elevated reporting limits, although reporting limits can be lowered somewhat by increasing the level of cleanup and concentration of the extract. This comes with an increase in cost and an increased risk of concentrating interfering compounds present in the sample.

So, when planning a sampling and analysis plan, should the focus be on individual PCB congeners or Aroclor mixtures? To properly address this question, a number of factors need to be considered, including site history; data quality objectives (DQOs) for the project; risk assessment and management; cost of analysis (budget); and turnaround time. Table 2 offers some of the pros and cons associated with each of the above-noted analytical approaches.



Table 2: Pros and Cons of PCB Analytical Methods

Method	Pros	Cons
GC/ ECD	<ul style="list-style-type: none"> • Low cost • Faster Turnaround time 	<ul style="list-style-type: none"> • Interferences may bias results high • Quantitation is based on pattern recognition rather than individual compounds which may over- or under estimate the true concentration
GC/ LRMS	<ul style="list-style-type: none"> • Summation of homologue groups provides a better representation of "total" PCB concentration 	<ul style="list-style-type: none"> • Interferences may bias data
HRGC/ HRMS	<ul style="list-style-type: none"> • Congener specific analysis provides a "truer" representation of the total PCB concentration in a sample • Low risk of interferences biasing results • Low limits of detection 	Labour/Capital intense analysis leading to: <ul style="list-style-type: none"> • High cost • Longer turnaround times

A primary advantage to analyzing for PCB congeners over Aroclors is in the area of risk assessment and establishing toxic effect. The World Health Organization has designated a series of twelve individual chlorinated biphenyl congeners as being "dioxin-like" in their potential health effects. These dioxin-like PCB congeners have been shown to exert a number of toxic responses similar to those of 2,3,7,8-tetrachlorodibenzo(p)dioxin (TCDD)—the most toxic dioxin. It is important, for the purpose of establishing risk, to be able to identify and quantify the dioxin-like PCBs at ultra-trace levels. 



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lab lines



The real name for "science" is magic.

Harlan Ellison,
science fiction author



ontario

Compressed Breathing Air Quality

Compressed breathing air is used in diverse activities or situations such as scuba diving, firefighting, rescue, aviation, power plant operation, paint booth or confined space entry. Basically, a portable source of breathing air is required whenever a clean source of air is not available from the surrounding atmosphere.

In the case of scuba divers, high quality air is absolutely necessary because inhaling air at depth (under pressure) means that the molecules making up each breath of air are more closely packed. If there are toxic chemicals (such as carbon monoxide) present, the increased density of the air allows more contaminant to be inhaled with each breath. This means that higher levels will enter the respiratory system. Even low levels of a contaminant at the surface can translate into very significant levels under pressure.

Thus, in the example of carbon monoxide, the allowable limit above water (at atmospheric pressure) is 25 parts per million per volume (ppmv), while the limit drops to 5 ppmv under pressure.

In an effort to minimize these risks, the Canadian Standards Association publishes the standards called CAN/CSA-Z180.1 and the CAN/CSA-Z275.2 to regulate the allowable levels of contaminants in pressurized air. These standards govern the following: carbon monoxide, carbon dioxide, methane, total hydrocarbons,

halogenated hydrocarbons, nitrogen dioxide, nitrous oxide, water, oil, particulates, condensates, and others.

It is required that compressed breathing air quality is performed every six months at the source (compressor). **b**

Summary of Analytical Methodologies for Compressed Gas Analysis

Method	Reference
Oxygen	GC/TCD
Oxygen	Paramagnetic Analyser
Nitrogen	GC/TCD
Methane	GC/FID
Carbon Dioxide	GC/FID
Carbon Monoxide	GC/FID
Non-methane Hydrocarbons	GC/FID
C2 – C4 Hydrocarbons	GC/FID
C2 Hydrocarbons	GC/FID
Halogenated Hydrocarbons	GC/ECD
Nitrous Oxide	GC/ECD
Dewpoint	Hygrometer
Nitrogen Dioxide	Chemiluminescence analyser
Unknown VOC	GC/MS
Unknown Sulfur Gas	GC/FPD
Percent Level Gases (%)	GC/TCD
Helium (%)	GC/TCD

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Holiday Hours



Important Notice: During the holiday season, Maxxam will have reduced staffing levels. If you are submitting samples during this time, please speak to your Project Manager to ensure hold and turnaround times can be met.

Special Notes: No sample receipt available after 12pm in Regional Offices due to hold times.

	Office Hours	Sample Reception Hours	Food Sample Reception	Regional Office Hours
Dec. 23	8:30am-5pm	8:30am-5pm	8:30am-5pm	8:30am-5pm
Dec. 24	8:30am-1pm	8:30am-1pm	8:30am-1pm	8:30am-1pm
Dec. 25	CLOSED	CLOSED	CLOSED	CLOSED
Dec. 26	CLOSED	CLOSED	CLOSED	CLOSED
Dec. 27	CLOSED	CLOSED	CLOSED	CLOSED
Dec. 28	CLOSED	CLOSED	CLOSED	CLOSED
Dec. 29	8:30am-5pm	8:30am-5pm	8:30am-5pm	8:30am-5pm
Dec. 30	8:30am-5pm	8:30am-5pm	8:30am-5pm	8:30am-5pm
Dec. 31	8:30am-1pm	8:30am-1pm	8:30am-1pm	8:30am-1pm
Jan. 1	CLOSED	CLOSED	CLOSED	CLOSED
Jan. 2	8:30am-5pm	8:30am-5pm	8:30am-5pm	8:30am-5pm